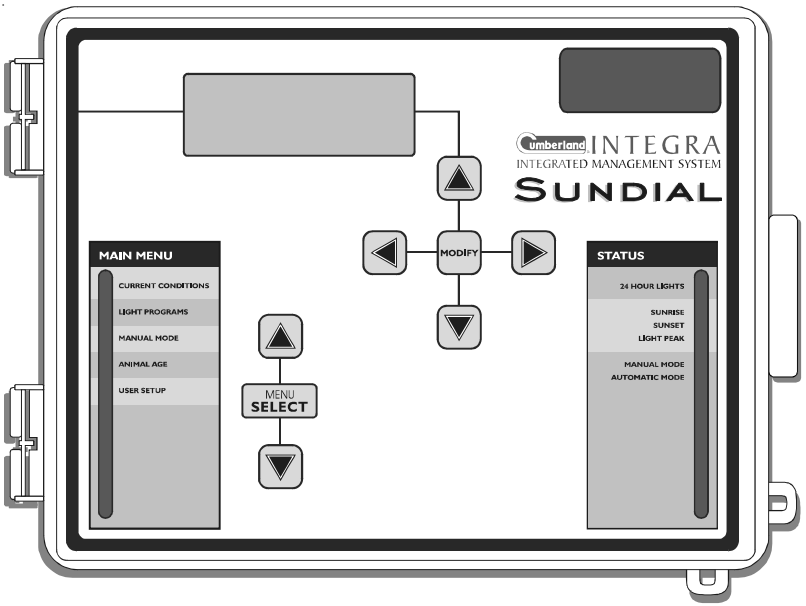
Light Dimmer Controller

SUNDIAL

USER'S MANUAL



1. PRECAUTIONS

Although fuses at the input and outputs of the controller protect its circuits in case of an overload or overvoltage, we recommend installing an additional protection device on the controller's supply circuit.

The room temperature where the controller is located MUST ALWAYS REMAIN BETWEEN 32°F AND 104°F (0°C TO 40°C).

To avoid exposing the controller to harmful gases or excessive humidity, it is preferable to install it in a corridor.

DO NOT SPRAY WATER ON THE CONTROLLER

FOR CUSTOMER USE

Enter the serial number located on the side of the controller below for future reference.

Model number: SUNDIAL

Serial number: _____

TABLE OF CONTENTS

Page

1. PRECAUTIONS 2

2. FEATURES 4

3. MOUNTING INSTRUCTIONS 6

3.1 Connection 6

4. USER INTERFACE 7

4.1 Location of the Controls 7
4.2 How to Select & Modify the Parameters 8
4.3 Status Leds' Meaning 8

5 USER SETUP 9

5.1 Time & Date 9
5.2 Password 9
5.3 Installation Options 11
5.4 Controller Version 11

6 LIGHT PROGRAMS 12

6.1 Principle of Operation 12
6.2 Settings 15
6.2.1 24 Hour Lights' Settings 15
6.2.2 Light Cycles' Common Settings 16
6.2.3 Light Cycles' Specific Settings 17
6.2.4 Light Peak Settings 18
6.3 Manual/Automatic Mode 19
6.4 Current Conditions 20
6.5 Alarms 20

7. ANIMAL AGE 21

8. USING THE MEMORY STICK 22

8.1 Load a Configuration into the Controller 22
8.2 Saving a Configuration 23

INSTALLATION REPORT 24

2. FEATURES

The SUNDIAL is a light dimmer controller that is used to regulate the light intensity in livestock buildings. It offers great flexibility in the light intensity adjustment. Many options are provided to assure the light intensity is always adapted to the animals' needs as they are growing.

MAIN FEATURES:

LCD DISPLAY
An LCD display provides an efficient interface for displaying, monitoring and adjusting parameter values.

PILOT LIGHTS & LED DISPLAY
Pilot lights indicating the state of outputs and a led display showing the current light intensity allow the user to monitor the operation of the system without having to enter the building.

10 LIGHT PROGRAMS
The controller can use up to 10 different light programs based on the animal age. The light intensity thus always suits the animals' requirements.

6 SUNRISE/ SUNSET CYCLES
Up to 6 cycles can be enabled in each light program to change the light intensity within the day. The light intensity can gradually increase at the beginning of a cycle and gradually decrease at the end of a cycle to simulate a sunrise and a sunset.

LIGHT PEAKS
Short and marked increases in the light intensity can be added to stimulate the animals. When enabled, the peaks are performed regularly according to a user-defined frequency.

AUTOMATIC / MANUAL MODE
The user can easily switch to a manual mode that permits to adjust the light intensity to a specific value.

PASSWORD PROTECTION
A password feature is used to restrict access to the controller setup functions.

BACKUP BATTERY
A backup battery allows the unit to keep time and settings in case of a power failure.

OVERLOAD AND OVERVOLTAGE PROTECTION
Resettable fuses are provided at low-voltage inputs and outputs of the controller to protect its circuitry in the case of an overload or overvoltage.

COMPUTER CONTROL
The controller can be connected to a computer, thus making it possible to centralize the management of information and diversify control strategies.

3. MOUNTING INSTRUCTIONS

Open the latch and open the cover. Remove the black caps located on each of the four mounting holes. Mount the enclosure on the wall using four screws. Be sure the electrical knockouts are at the bottom of the enclosure in order to prevent water from entering the controller. Insert the screws in the mounting holes and tighten. Fasten the four black caps provided with the controller onto the four mounting holes. The enclosure must be mounted in a location that will allow the cover to be completely opened right up against the wall.

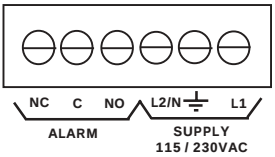
3.1 CONNECTION

To connect the controller, refer to the wiring diagram enclosed with this user's manual. Use the electrical knockouts provided at the bottom of the enclosure. Do not make additional holes in the enclosure, particularly on the side of the enclosure when using a computer communications module.

ALL WIRING MUST BE DONE BY AN AUTHORIZED ELECTRICIAN AND MUST COMPLY WITH APPLICABLE CODES, LAWS AND REGULATIONS. BE SURE POWER IS OFF BEFORE DOING ANY WIRING TO AVOID ELECTRICAL SHOCKS AND EQUIPMENT DAMAGE.

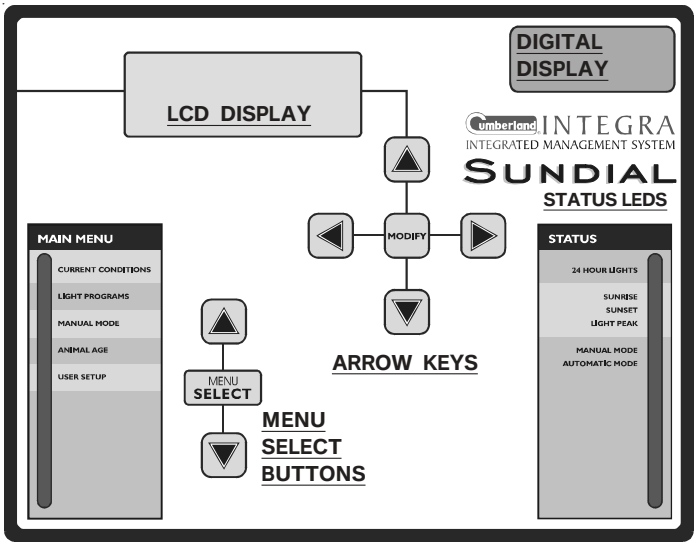
ALARM

There are two types of alarms on the market. One type activates when current is cut off at its input, whereas the other activates when current is supplied at its input. For an alarm of the first type, use the NC terminal as shown on the wiring diagram. For an alarm of the second type, use the NO terminal.



4. USER INTERFACE

4.1 LOCATION OF THE CONTROLS



LCD Display: The LCD screen gives the current readings and displays the parameters when you select a function. When the parameters for a given function cannot all be presented at once on the display, arrows are displayed on the right hand side to indicate that additional parameters can be displayed using the arrow keys. After 5 minutes of inactivity, the display returns to the **CURRENT CONDITIONS** display.

Menu Select buttons: The up and down-arrow keys are used to scroll into the main menu located on the left side of the controller.

Arrow Keys: The up and down-arrow keys are used to scroll within a function menu. The right-arrow key is used to select a menu option. The left-arrow key is used to return to the previous menu display.

Modify Button: The Modify key is used to change a parameter value. Once the Modify key is pressed, the selected parameter flashes quicker on the display. Use the up and down-arrow keys to adjust the parameter.

Digital Display: This display shows the current light intensity, as defined by the light programs.

4.2 HOW TO SELECT & MODIFY THE PARAMETERS

PARAMETER SELECTION:

- Use the arrow keys to navigate within the LCD display in order to select the desired parameter.

PARAMETER ADJUSTMENT:

- A parameter that can be adjusted slowly blinks when it is selected. If a value does not flash when being selected, it means that the value is a reading. It thus cannot be changed.

- Press the **Modify** button once to access the edition mode. The parameter then flashes quickly. It is now possible to modify the parameter's value.

- Use the up and down-arrow keys to set the parameter to the desired value.

- Press the **Modify** button once again to validate the new value and to exit from the edition mode.

4.3 STATUS LEDS' MEANING

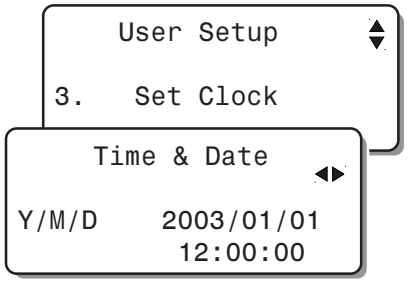
LED	MEANING
24 HOUR LIGHTS	TURNS ON WHEN A 24 HOUR LIGHT PROGRAM IS ACTIVE.
SUNRISE	TURNS ON WHEN A SUNRISE IS IN PROGRESS
SUNSET	TURNS ON WHEN A SUNSET IS IN PROGRESS
LIGHT PEAK	TURNS ON WHEN A LIGHT PEAK IS EXECUTED.
MANUAL MODE	TURNS ON WHEN THE CONTROLLER IS IN MANUAL MODE.
AUTOMATIC MODE	TURNS ON WHEN THE CONTROLLER IS IN AUTOMATIC MODE.

5 USER SETUP

5.1 TIME & DATE

- Select the following items from the main menu:

  USER SETUP:
  - 3. Set Clock
  The current mode is displayed.



- Press the right-arrow key once. The year flashes on the display. Press the Modify button to edit the value then use the arrow keys to set the year.

- Press the right-arrow key once again to step to the next item. Proceed in similar fashion to set the whole time and date.

5.2 PASSWORD

This function allows to identify 2 different user types. It is used to restrict access to certain parameter settings. The password is made up of three blocks of two digits, for example: 13 44 21. When a correct password is entered, the current user is identified.

Installer Password: By default, the INSTALLER PASSWORD is set to **"06-01-00"**. The installer mode gives full access to all the functions of the controller. By default, the controller exits from the installer mode after 15 minutes of inactivity. The installer password can be modified as explained below.

User Password: The user mode gives access to the basic functions of the controller. By default this password is set to "**01-02-03**". Note that some menus will not be accessible from the user mode. The user password cannot be modified and is automatically selected after 15 minutes of inactivity.

ENTERING A PASSWORD:

- Select the following items from the main menu:

  USER SETUP:
  - 1. Password

- Press the right-arrow key to enter the password. The first two-digit number flashes on the display. Press the Modify button once then use the arrow keys to set the first number.

- Press the right-arrow key once. The second two-digit number flashes on the display. Press the Modify button then use the up and down-arrow keys to set the second number. Proceed in similar fashion to enter the third number. Press the right-arrow key one last time to validate the whole password.

- If the entered password is incorrect, the error message “Wrong Password” is displayed.

MODIFYING THE INSTALLER PASSWORD:
The installer password must be entered first before being allowed to modify it. Proceed as explained above to enter the installer password: (06-01-00 by default).

Note : The password "01-02-03" is reserved for the user mode. Do not use the same code for the installer password.

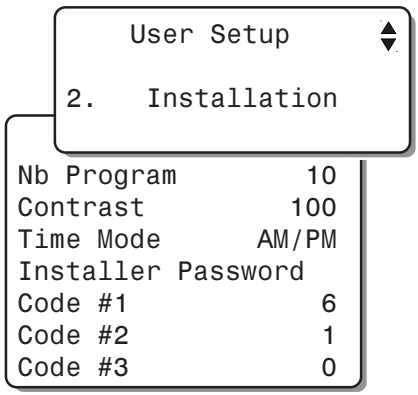
- Select the following items from the main menu:

  USER SETUP:
  - 2. Installation

  This menu is only available from the installer mode.

- Press the down-arrow key in order to select the first two-digit code of the installer password.

- Press the Modify button then use the arrow keys to set the password's first number to the desired value. Press the Modify button once again to validate the first number of the code.



- Press the down-arrow key once. The password's second number flashes on the display. Proceed in similar fashion to modify the password's second and third numbers.

5.3 INSTALLATION OPTIONS

The following section describes how to customize the controller for your particular application. Normally, this setup needs to be done only once.

■ Select the following items from the main menu:

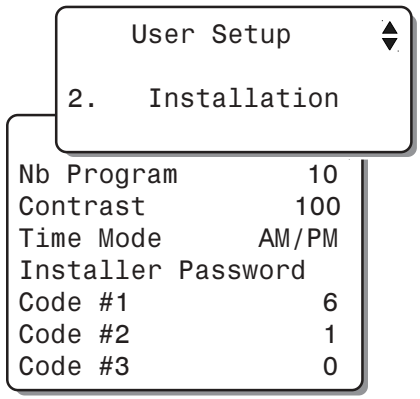
USER SETUP:
- 2. Installation
This menu is only available from the installer mode (s.5.2).

■ Set the parameters that suit your application:

- **Number of light programs:**
  Select the proper number of light programs. Adjustable from 1 to 10 programs.
  Refer to section 6.1 for further information about these programs.

- **Contrast:**
  Select the LCD screen's appropriate contrast level. Adjustable from 10 to 100%.

- **Time Mode:**
  Select the desired time format (AM/PM or 24 hours).

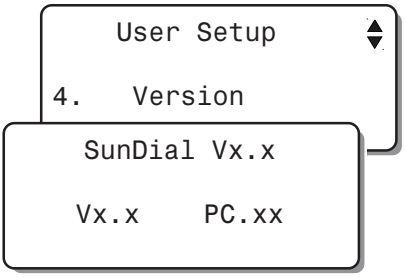


5.4 CONTROLLER VERSION

This menu allows to display information concerning your controller's version. This piece of information is useful to obtain technical support that is adapted to your specific controller's version.

■ Select the following items from the main menu:

USER SETUP:
- 2. Installation
4. Version

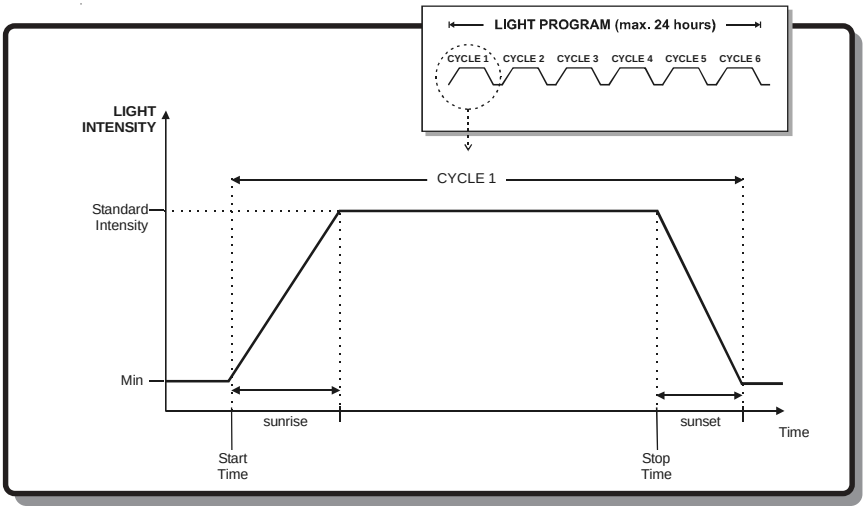


6 LIGHT PROGRAMS

6.1 PRINCIPLE OF OPERATION

A program consists of up to 6 cycles that are daily performed to adjust the light intensity in the house. If no variation in the light intensity is required for a specific program, the *24 hour light function* allows to keep the lights turned on permanently within this program. A light program is repeated daily up until another light program replaces it. The user defines the day at which each program starts based on the the animal age. Up to 10 light programs can be used.

LIGHT CYCLES:
Each light program can control up to 6 cycles. These cycles are used to change the light intensity within a daily light program.



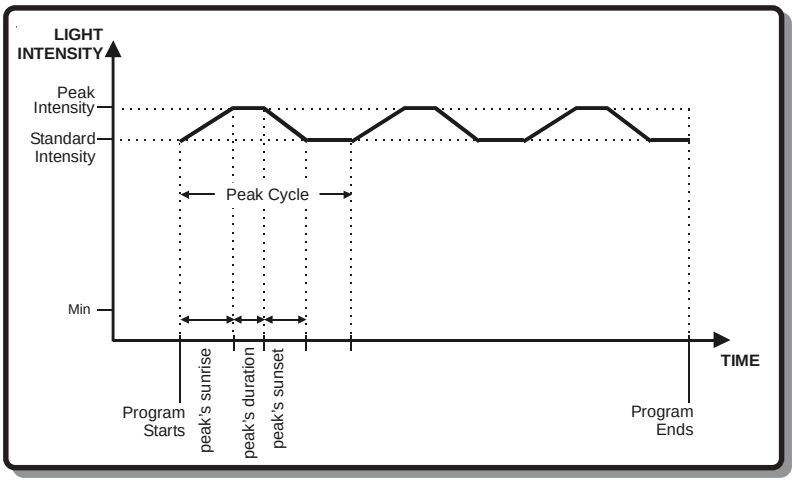
GRAPHIC : Light Cycles

When the cycle's start time is reached, the light intensity gradually increases over the sunrise delay. The standard light intensity is attained when the sunrise delay is elapsed. This intensity is maintained until the stop time. It then decreases over the sunset delay and reaches the minimum intensity back. The minimum intensity is maintained until the start time of the following cycle.

24 HOUR LIGHTS:
The lights remain on, at the standard intensity, during the whole program.

LIGHT PEAKS:
Light peaks are marked increases in light intensity over a short period of time. They are generally used to stimulate the animals. When activated, the light peaks start immediately following the sunrise at the beginning of the cycle or at the beginning of a 24 hour light program. They are then performed on a regular basis, following a user-defined frequency.

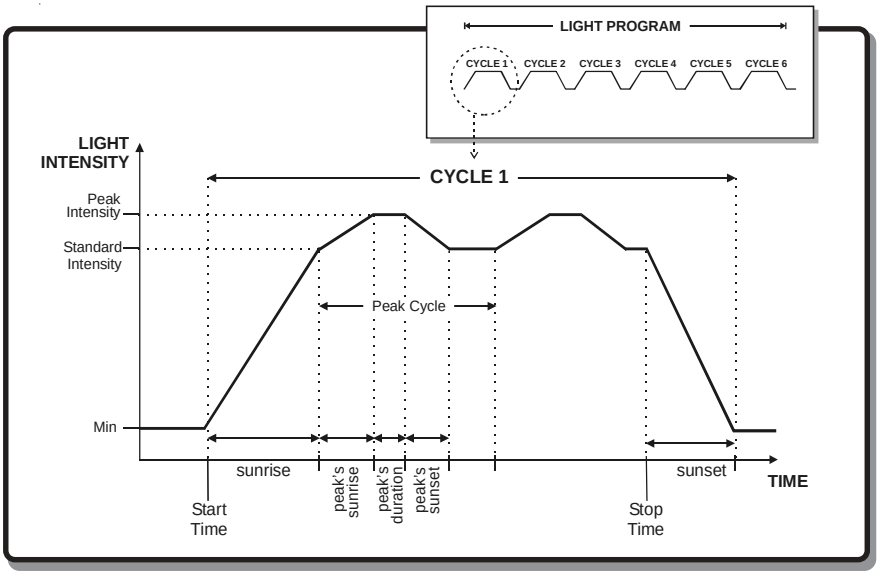
24 Hour Light Program using Peaks:
The first light peak is executed immediately at the beginning of the 24H light program. The light intensity increases from the standard intensity to reach the peak's intensity over the peak's sunrise delay. The peak intensity is maintained during the peak's duration delay. The light intensity then gradually decreases over the peak's sunset delay. The next peak is performed at the end of the peak cycle.



GRAPHIC : 24 Hour Light Program with Peaks

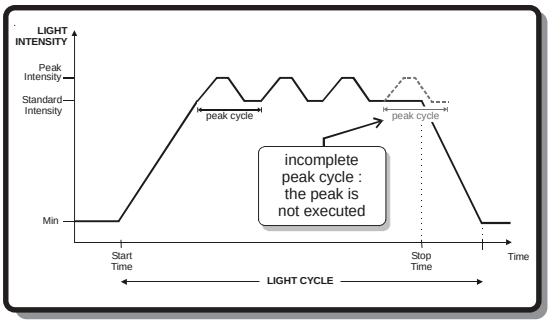
Peaks on a Light Cycle:

The first light peak is performed immediately following the cycle's sunrise. The lights increase from the standard intensity to reach the peak's intensity over the peak's sunrise delay. The peak intensity is maintained over the peak's duration delay then decreases back to the standard intensity over the peak's sunset. The next peak is performed at the end of the peak cycle.



GRAPHIC : 1 Light Cycle Using Peaks

In order to be performed, the whole peak cycle must be completed before the light cycle's stop time, otherwise the peak is not executed. The following graphic illustrates this situation.



6.2 SETTINGS

6.2.1 24 Hour Lights' Settings

This section shows how to set the parameters of a 24H light program, i.e a program in which the lights stay on permanently at the same intensity.

■ Select the following items from the main menu:

```
LIGHT PROGRAMS:
- Select the desired light program
     - 1. Settings
```

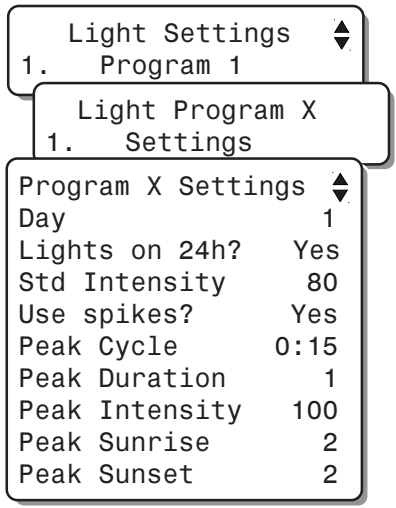
The following parameters can be accessed by all user types but can only be modified from the installer mode (s. 5.2).

■ Set the parameters that suit your application.
(Refer to the sec. 6.1 to get further information on these parameters)

- **Day:**
  This is the day at which the selected program starts. Adjustable from 0 to 450 days. Note that the previous light program is automatically disabled when a new program starts.

- **Lights on 24 Hours:**
  Select "Yes" to enable the 24h light function. This will disable the light cycles within the selected program.

- **Standard Intensity:**
  Standard light intensity when the lights 24H light option is used. Adjustable from 0 (Off) to 100%.



- **Use Spikes ?**
  Select "Yes" to enable the light peaks within the selected program. Refer to section 6.2.4 to adjust the peaks' parameters.

6.2.2 Light Cycles' Common Settings

The following parameters are common to all light cycles within a program.

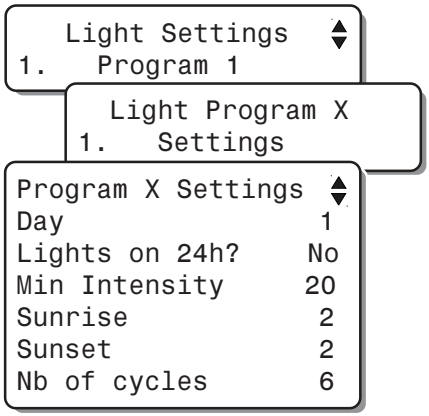
■ Select the following items from the main menu:

LIGHT PROGRAMS:
- Select the desired light program
- 1. Settings

The following parameters can be accessed by all user types but can only be modified from the installer mode (s. 5.2).

■ Set the parameters that suit your application. Note that templates are available at the end of this manual to help the planning of light cycles.
(Refer to the sec. 6.1 to get further information on these parameters)

- **Day:**
  This is the day at which the selected program starts. Adjustable from 0 to 450 days. Note that the previous light program is automatically disabled when a new program starts.



- **Lights on 24 Hours:**
  Select "No" to disable the 24h light function. This will enable the light cycles within the selected program.

- **Minimum Intensity:**
  Light intensity that is used when no cycle is active. Adjustable from 0 (Off) to 100%.

- **Sunrise:**
  When a cycle starts, the light intensity increases from its minimum to its standard intensity over this period of time. Adjustable from 0 to 60 min.

- **Sunset:**
  When the cycle's stop time is reached, the light intensity gradually decreases from its standard intensity to its minimum intensity over this period of time. Adjustable from 0 to 60 minutes.
- **Number of Cycles:**
  Set the required number of cycles within the selected light program. Adjustable from 1 to 6 cycles.

6.2.3 Light Cycles' Specific Settings

The following parameters must be set separately for every light cycle.

■ Select the following items from the main menu:
LIGHT PROGRAMS:
- Select the desired light program
- Y. Select the proper light cycle
The "Lights on 24h" option must be disabled on the selected program in order to access the light cycles' menu (s. 6.2.1).

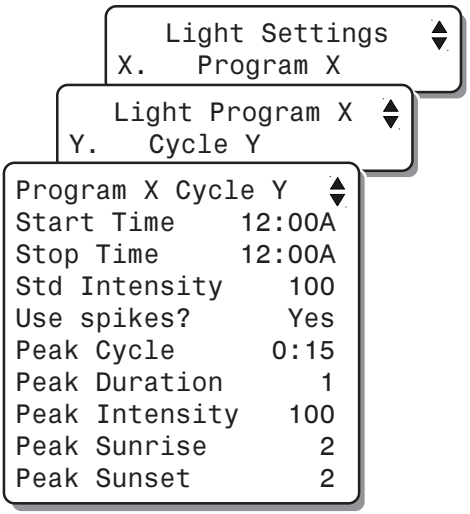
■ Set the parameters that suit your application.
(Refer to the sec. 6.1 to get further information on these parameters)

The following parameters can be accessed by all user types but can only be modified from the installer mode (s. 5.2).

- Start Time:
Time at which the selected cycle starts. Make sure the cycles do not overlap each other.

- Stop Time:
Time at which the light intensity starts decreasing (the sunset begins).

- Standard Intensity:
This is the regular light intensity that is used within the cycles. Adjustable from



0 to 100% and must be set to a higher intensity than the minimum intensity value.

- Use Spikes ?
Select "Yes" to activate light peaks within the selected program. Refer to next section to set the light peaks' parameters.

6.2.4 Light Peak Settings

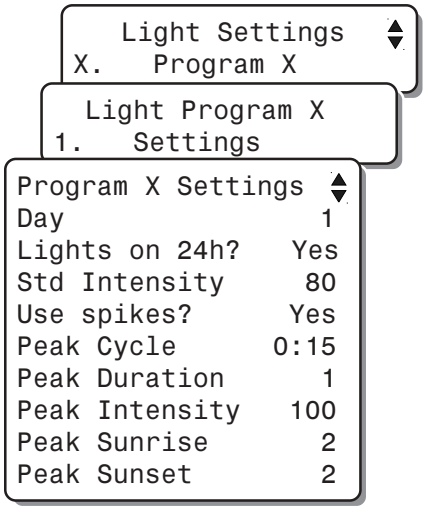
24H LIGHTS USING PEAKS
If a program uses the "24h light program", the light peak menus are located directly in the Program Settings menu as follows:

- Select the following items from the main menu:

  LIGHT PROGRAMS:

  - Select the desired light program

  - 1. Settings



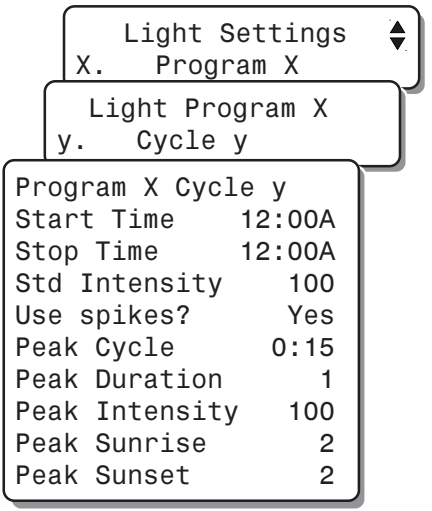
LIGHT CYCLES USING PEAKS
If a program uses light cycles, the light peaks options are located in each cycle's menu as follows:

- Select the following items from the main menu:

  LIGHT PROGRAMS:

  - Select the desired light program

  - Y. Select the proper cycle



The following parameters can be accessed by all user types but can only be modified from the installer mode (s. 5.2).

■ Set the parameters that suit your application.
(Refer to the sec. 6.1 to get further information on these parameters)

- **Use Spikes ?:**
  Select "Yes" to activate the light peaks.

- **Peak Cycle:**
  Time that is required to perform a whole light peak cycle. The peaks' cycle time must be even or greater than: peak duration + peak sunrise + peak sunset. Refer to the previous graphic.

- **Peak's Duration:**
  Delay during which the peak's intensity is maintained.
  Adjustable from 1 to 59 minutes.

- **Peak's Intensity:**
  Light intensity of a peak. Adjustable from 0 to 100% .It must be set to a greater value than the standard light intensity.

- **Peak's Sunrise / Sunset:**
  Rising and decreasing time of a light peak. Adjustable from 0 to 60 minutes.

6.3 MANUAL/AUTOMATIC MODE

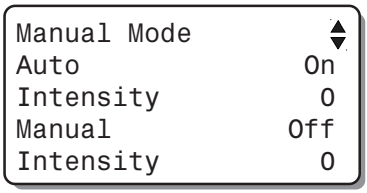
The manual mode can be enable at any time to manually change the light intensity in the house.

Note that the red LED display at the top right corner indicates the light intensity as measured by the current program. It does not indicate the manual mode's light intensity.

- Select the following item from the main menu:

  MANUAL MODE

- The following information is displayed:



Automatic mode

Status: The automatic mode's On/ Off status is displayed and cannot be modified. This status is related to the manual mode status, i.e. if the manual mode is activated the automatic mode is automatically disabled and vice versa.

Intensity: Current light intensity of the ongoing light program. This value is displayed as a reading and cannot be modified.

Manual Mode

Status: Select "On" to enable the manual mode. Set to "Off" to go back to the automatic mode.

Intensity: Select the desired light intensity. Adjustable from 0 to 100%.

6.4 CURRENT CONDITIONS

This menu gives a quick view of the actual lighitng conditions. This menu is automatically selected after 5 minutes of inactivity.

- Select the following item from the main menu:

  CURRENT CONDITIONS

- The following information is displayed:

  Ongoing light program ; Current animal age (in days) e & current light intensity (%).

6.5 ALARMS

An alarm situation occurs when power to the SUNDIAL fails. In this case, the alarm relay is activated. When the alarm relay is activated, the normally open contact (-●/●-) closes.

7. ANIMAL AGE

The light programs' activation is based on the animal age. Set it to the appropriate value as follows:

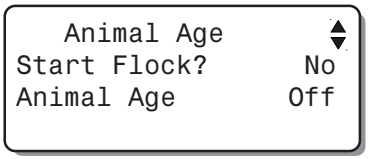
- Select the following items from the main menu:

  ANIMAL AGE

- The following information is displayed:

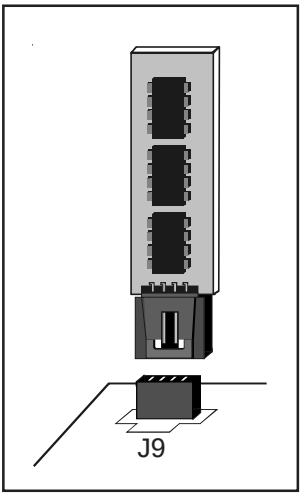
  Start Flock?
  The animal age automatically goes back to 1 day when a new flock starts.

  Animal Age
  Set the current animal age to the proper value. Adjustable from 0 to 450 days. Select "Off" to stop the light programs.



8. USING THE MEMORY STICK

8.1 LOAD A CONFIGURATION INTO THE CONTROLLER



Loading a Configuration from the Memory stick to the Controller:

1- Insert the memory stick in the J9 connector, at the top left corner of the board, with the components FACING DOWN.

2- Simultaneously press the **MENU SELECT** up and down-arrow keys ▲ ▼ during a 5 second delay. The following message is displayed: " MemStick to Control, Press ▲▼ to start".

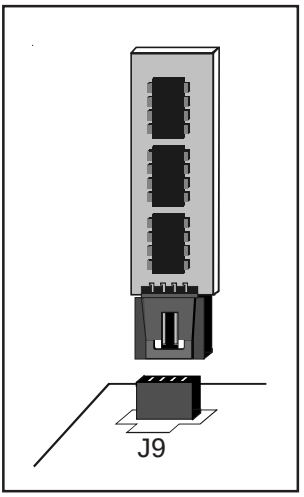
```
MemStick to Control ▲▼
Press ▲▼ to start
```

3- Simultaneously press the **ADJUSTMENT** up and down-arrow keys ▲ ▼. The configuration starts to load. Wait until it is completely loaded.

4- Once the configuration has reached 100%, press the **MENU SELECT** up and down-arrow keys ▲ ▼ simultaneously to exit this menu.

5- The new configuration is now loaded. Remove the memory stick from the connector.

8.2 SAVING A CONFIGURATION



Saving a Configuration from the Controller to the Memory Stick:

1- Insert the memory stick in the J9 connector, at the top left corner of the board, with the components FACING DOWN.

2- Simultaneously press the **MENU SELECT** up and down-arrow keys ▲ ▼ during a 5 second delay. The following message is displayed : "MemStick to Control, Press ▲▼ to start".

3 - Press the up-arrow key once. The following message is displayed: " Control to MemStick, Press ▲▼ to start".

4- Simultaneously press the **ADJUSTMENT** up and down-arrow keys ▲ ▼. The configuration starts to save. Wait until it is completely saved.

```
Control to MemStick ▲▼
Press ▲▼ to start
```

5- Once the configuration has reached 100%, press the **MENU SELECT** up and down-arrow keys ▲ ▼ once again to exit this menu.

6- The new configuration is now saved on the configuration module. Remove the memory stick from the connector.

INSTALLATION REPORT

PRODUCT: _____

SERIAL #: _____

DATE: _____

CLIENT

Name: _____

Address: _____

_____

_____

City: _____

Tel.: _____

Fax: _____

E-mail: _____

INSTALLER

Name: _____

Address: _____

_____

_____

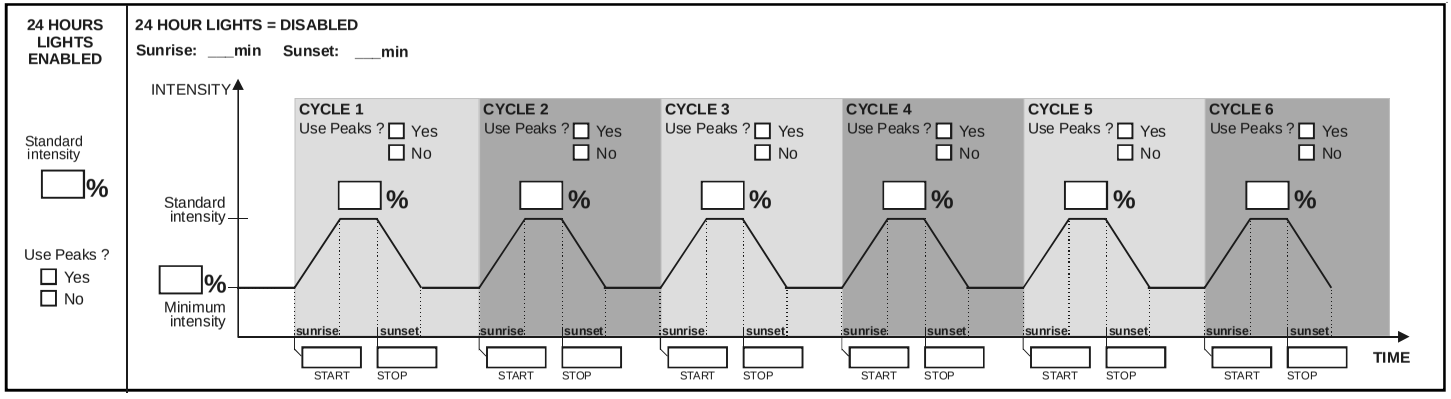
City: _____

Tel.: _____

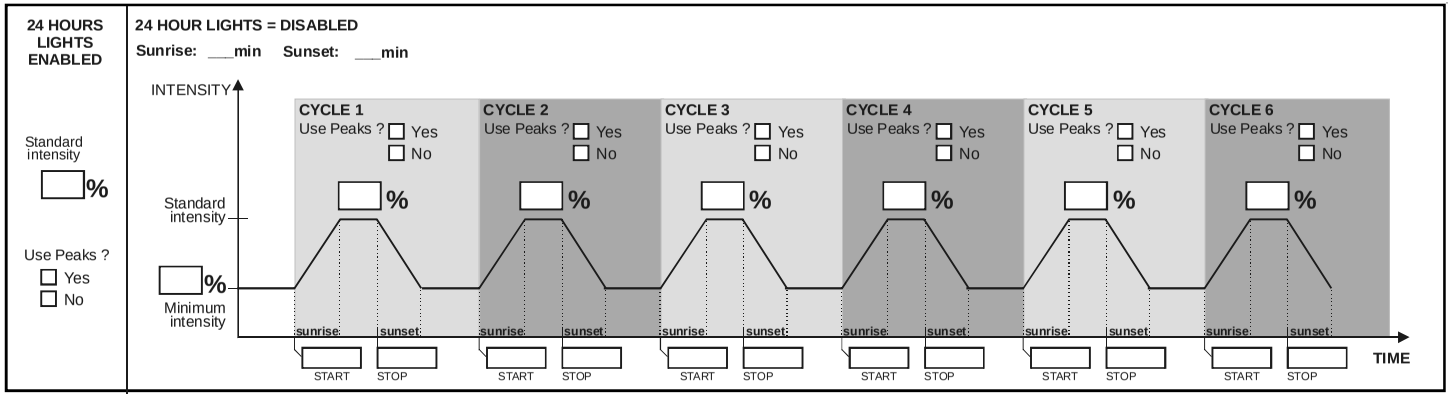
Fax: _____

E-mail: _____

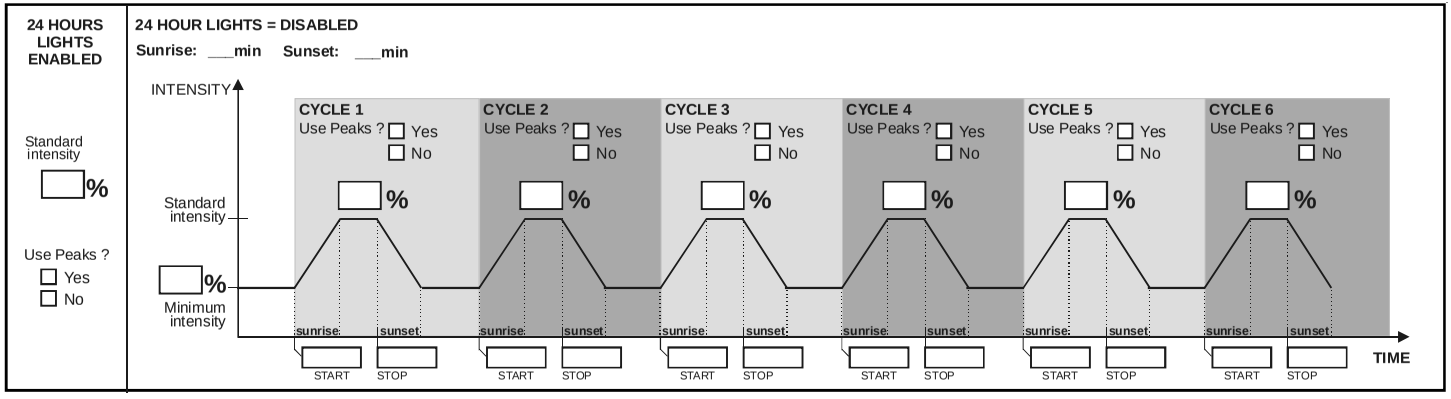
PROGRAM 1: starts at day _____



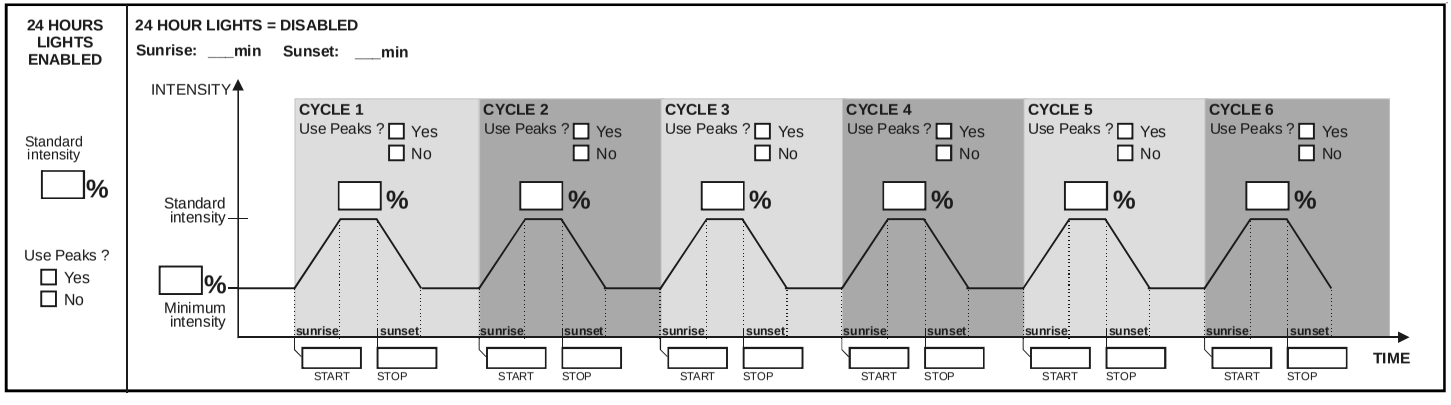
PROGRAM 2: starts at day _____



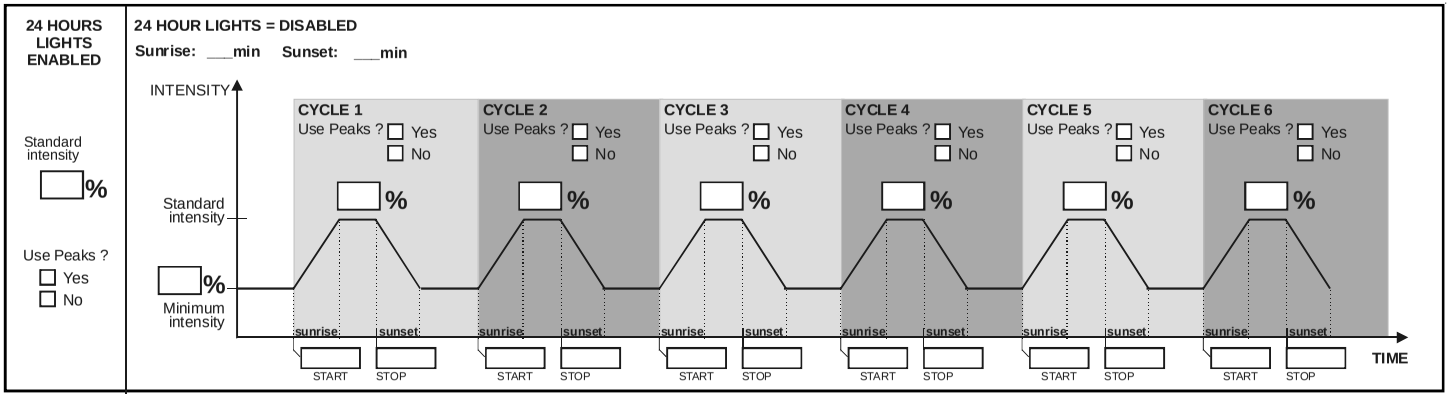
PROGRAM 3: starts at day _____



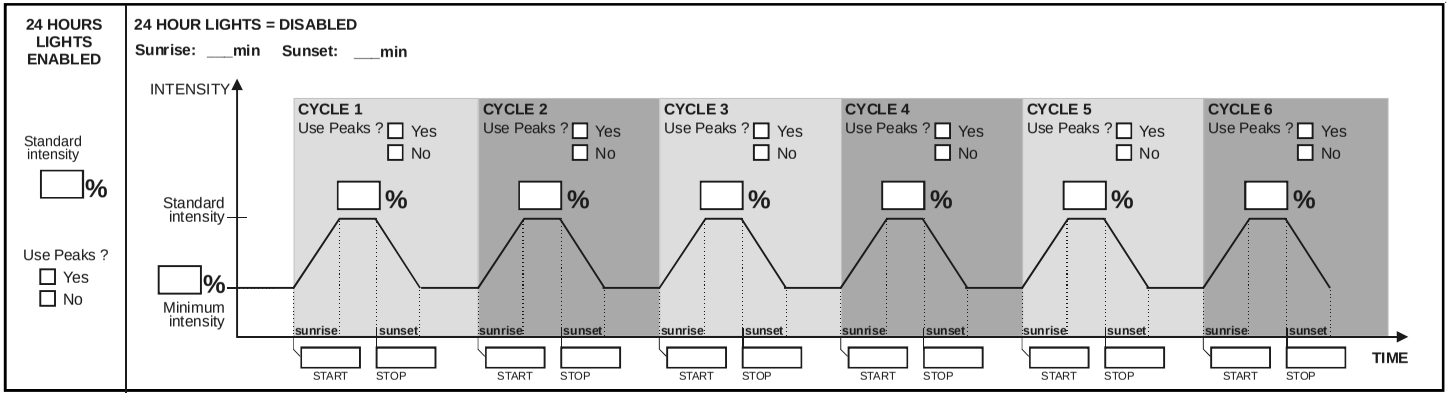
PROGRAM 4: starts at day _____



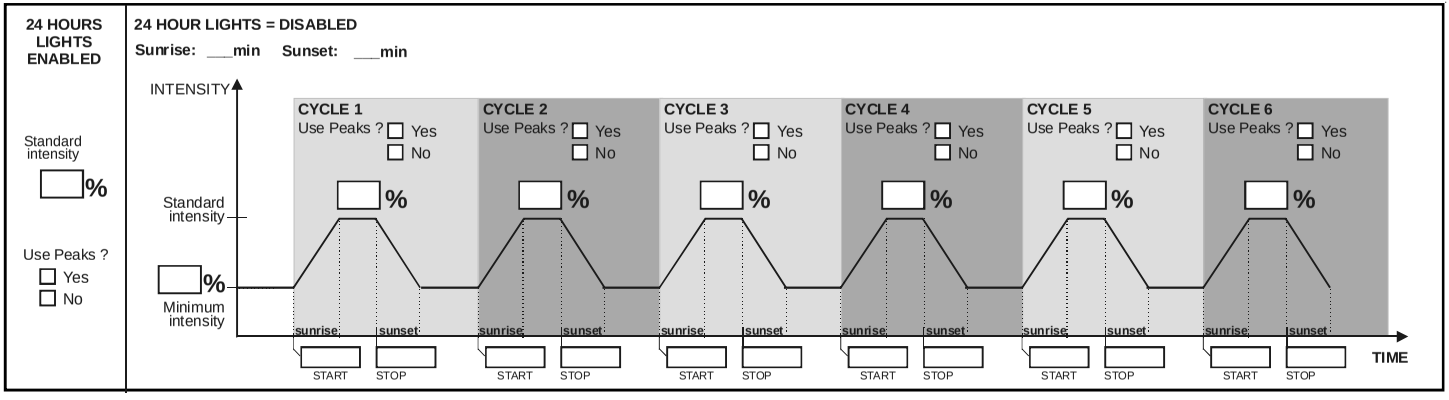
PROGRAM 5: starts at day _____



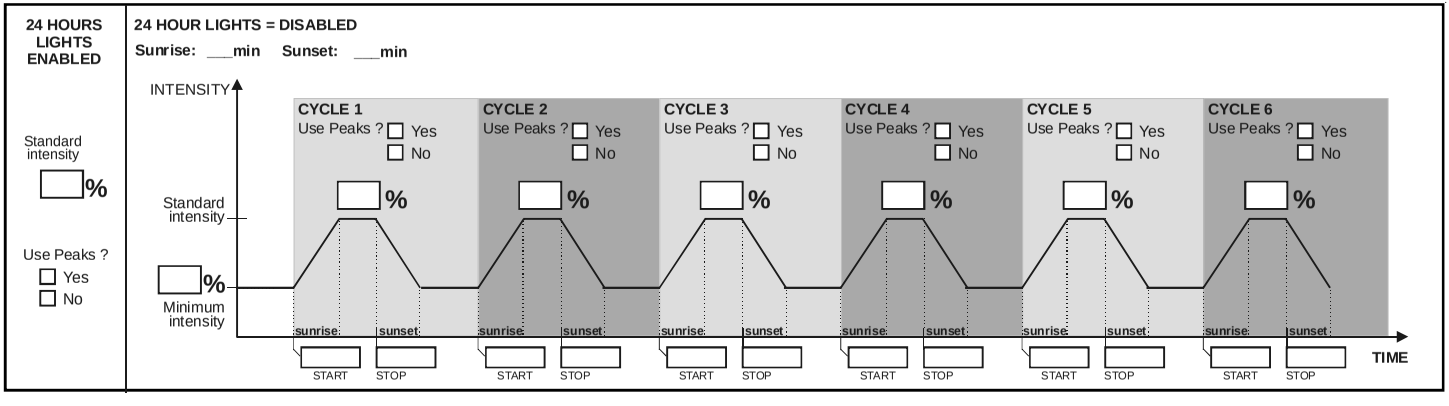
PROGRAM 6: starts at day _____



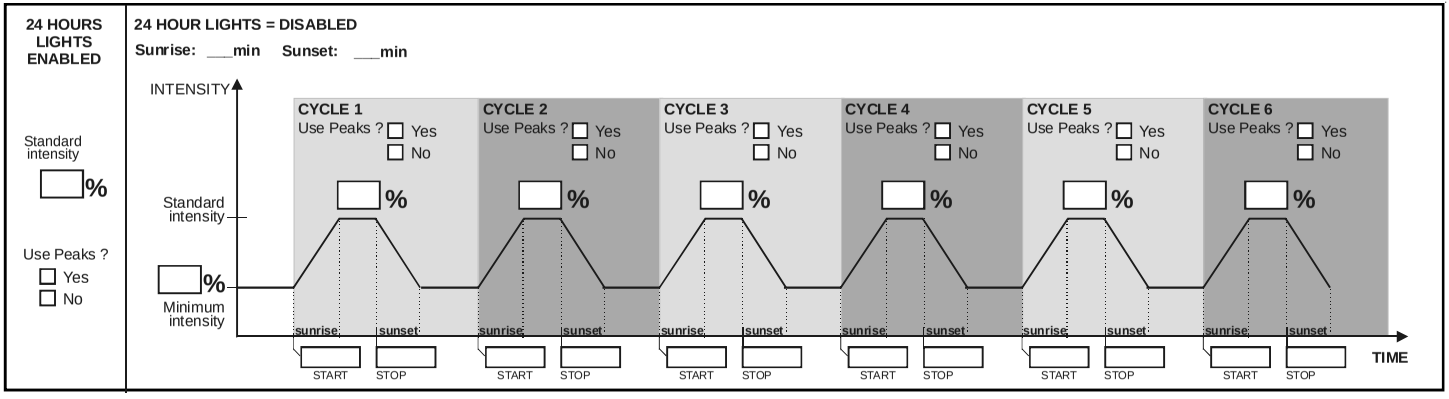
PROGRAM 7: starts at day _____



PROGRAM 8: starts at day _____



PROGRAM 9: starts at day _____



PROGRAM 10: starts at day _____